

FIG. 1A

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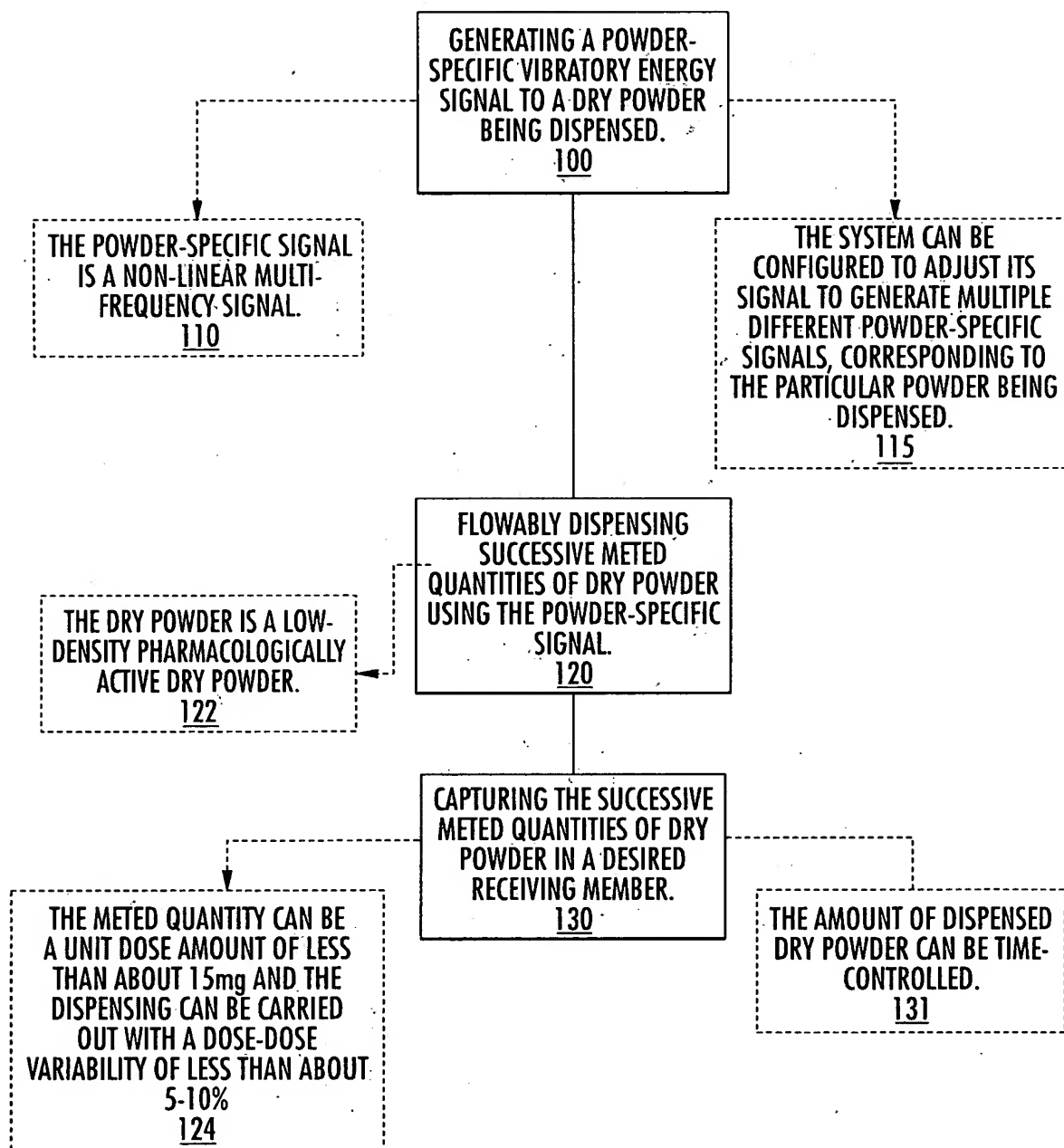


FIG. 1B

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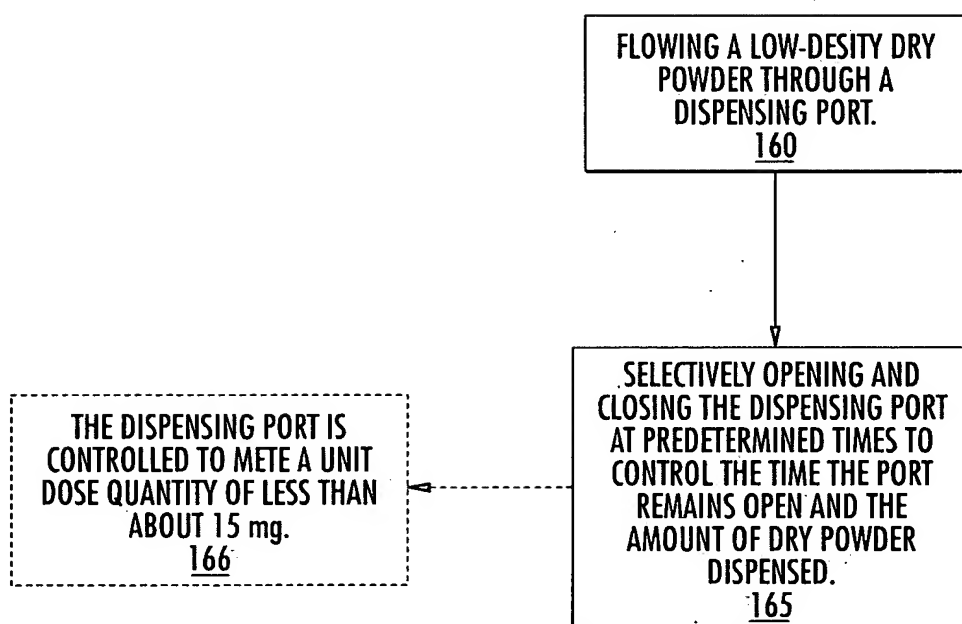
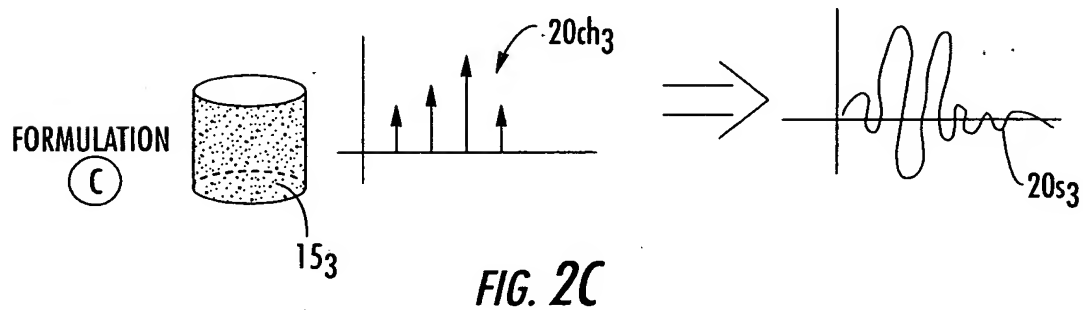
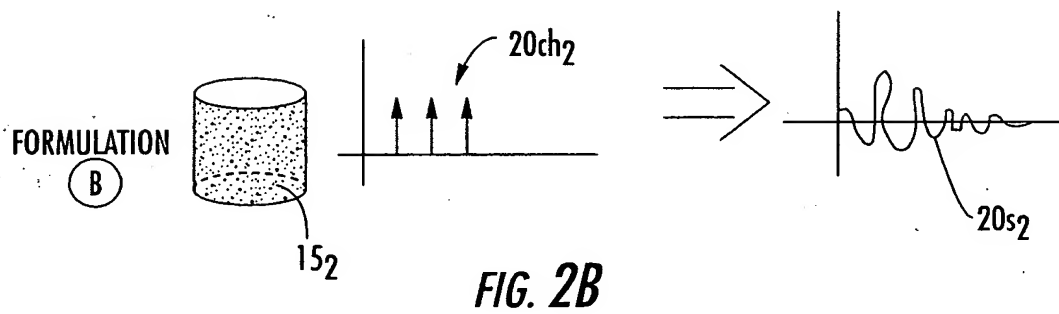
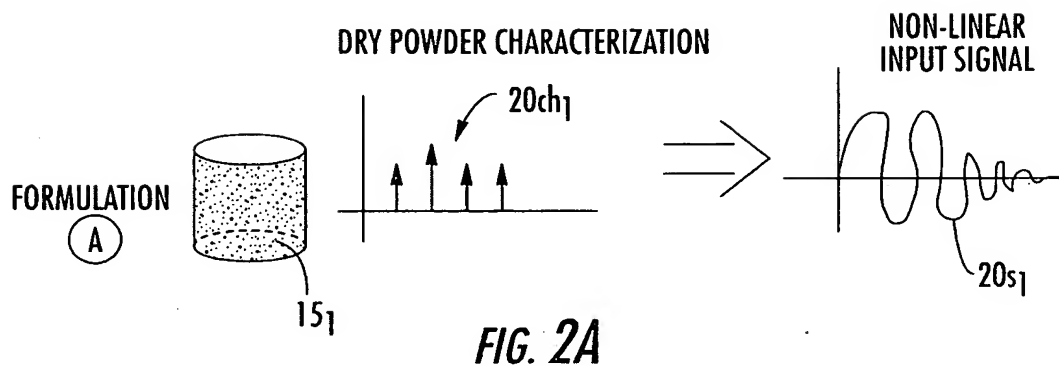


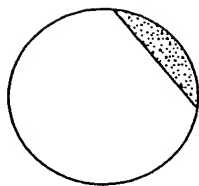
FIG. 1C

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SIGNAL GENERATION ALGORITHM

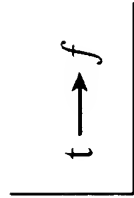
FIG. 3A



MEASURE TIME BETWEEN  
AVALANCHES FOR  
POWDERS IN  
ROTATING DRUM



FIG. 3B



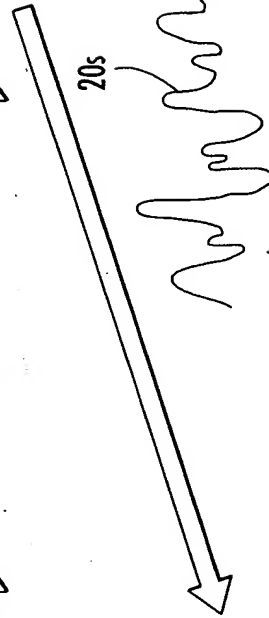
CONVERT TIME  
TO FREQUENCY SPACE



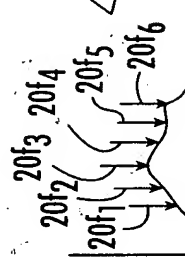
FIG. 3C



PLOT DISTRIBUTION  
OF FREQUENCIES



SUPERIMPOSE THESE SIX  
FREQUENCIES TO CONSTRUCT  
A SINGLE SUPERPOSITION  
SIGNAL (CAN INCLUDE  
STEP OF ADJUSTING RELATIVE  
AMPLITUDES)

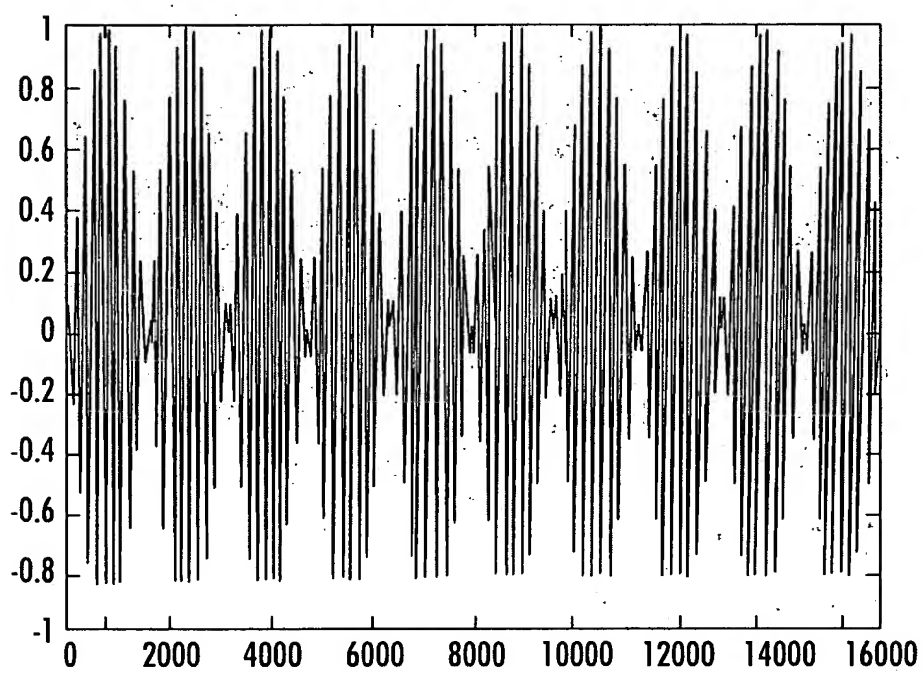


RECORD TOP SIX MOST  
OBSERVED FREQUENCIES,  
TYPICALLY REPRESENTING  
75% OF DISTRIBUTION

FIG. 3D

FIG. 3E

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*FIG. 4*

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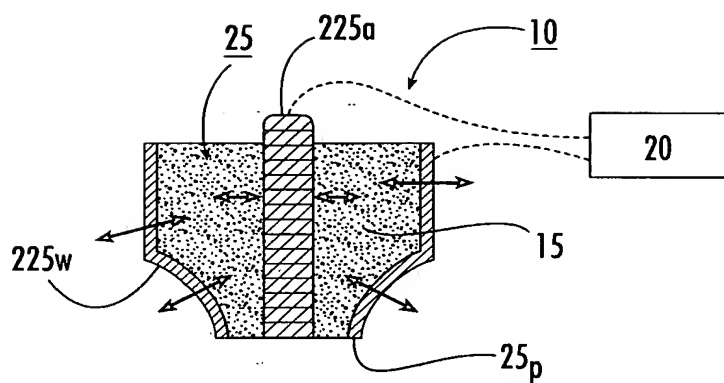


FIG. 5A

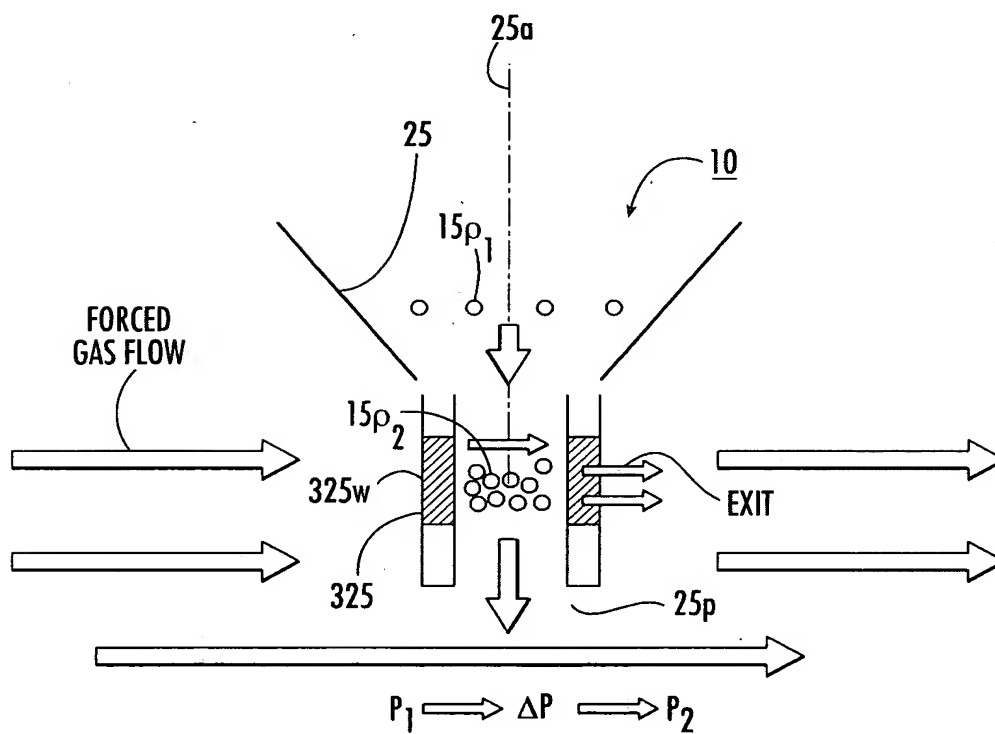


FIG. 5B

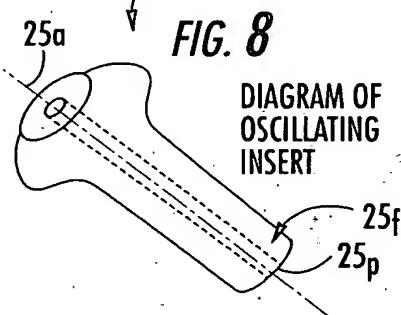
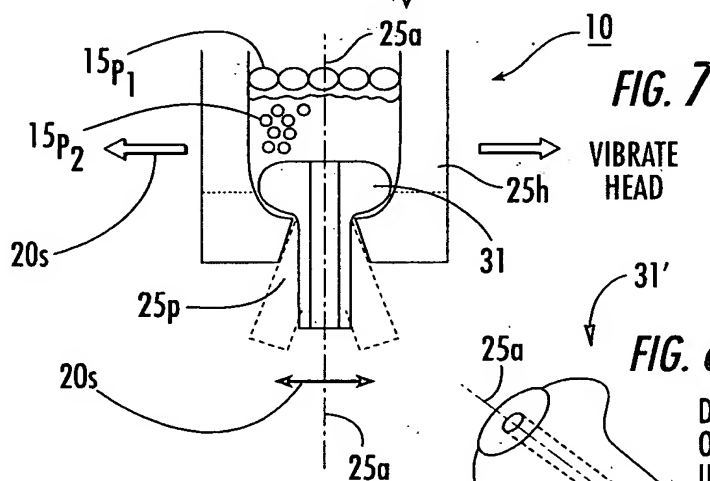
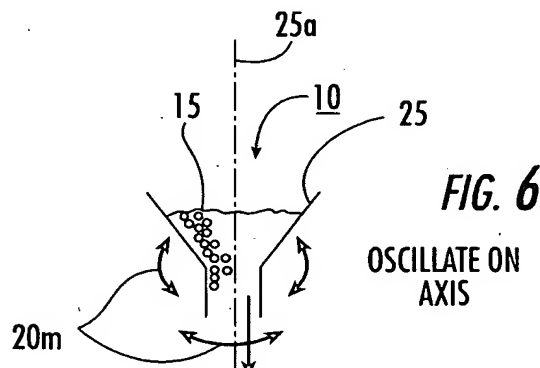
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# NON-LINEAR VIBRATION / CENTRIFUGATION PRINCIPLE OF POWDER FILLING

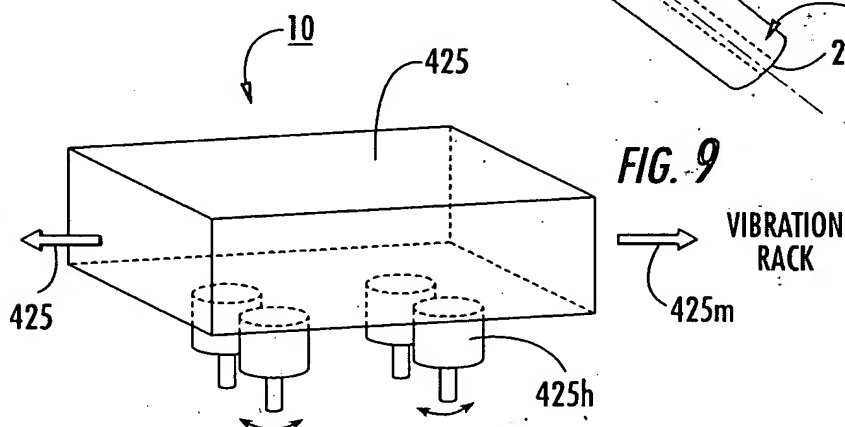
BASIC PRINCIPLE:

COMBINE NON-LINEAR FUNCTION  
WITH CENTRIFUGAL MOTION

THIS CAN BE ADAPTED  
TO LOCAL NON-LINEAR  
VIBRATION.

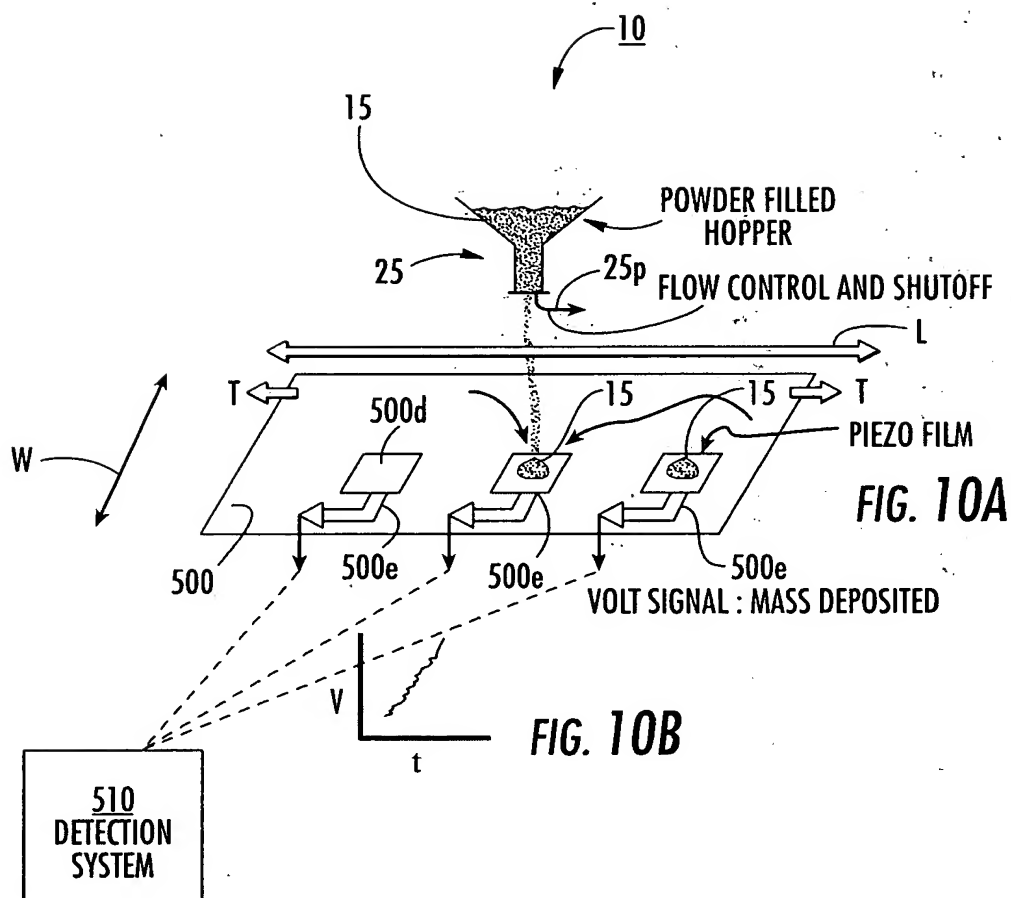


VIBRATION CAN BE  
APPLIED TO A  
RACK OF HEADS FILLING  
FROM SINGLE HOPPER

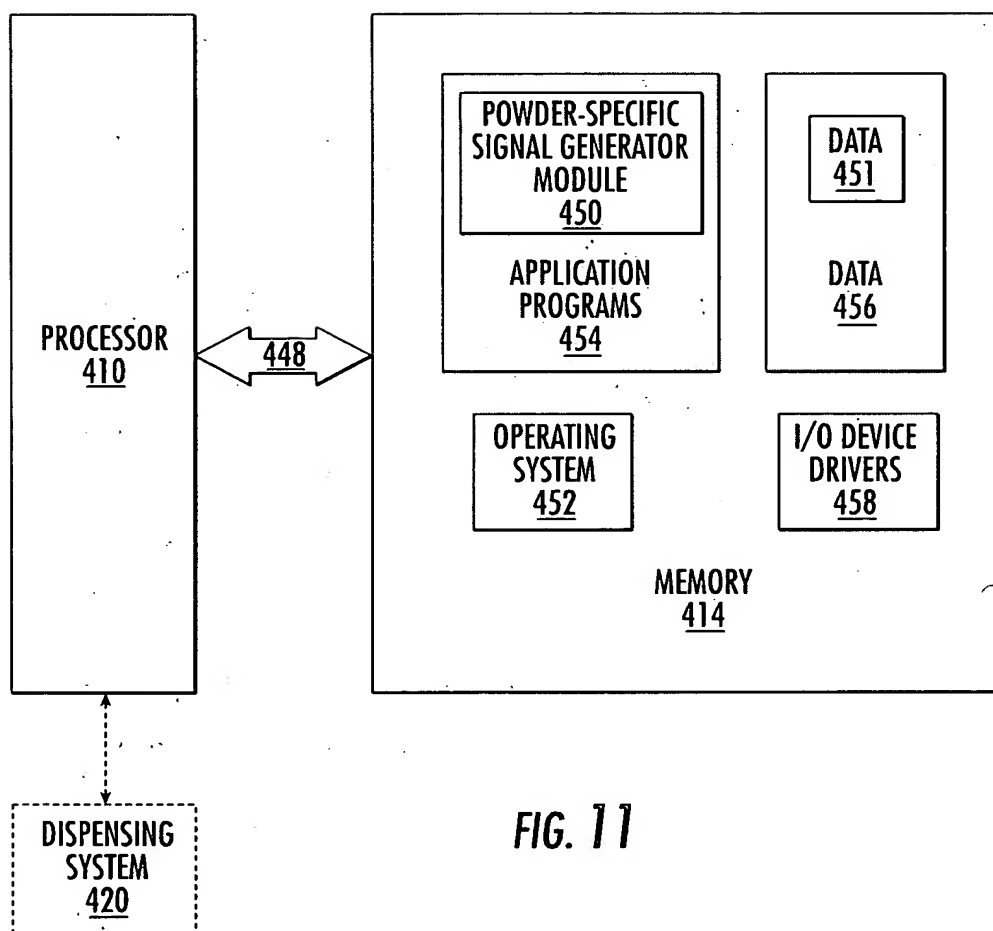


RADIUS (OR EXTREMES) OF MOTION CAN BE VERY SMALL. AT HIGH FREQUENCY  
THE ANGULAR VELOCITY WILL BE SUFFICIENT TO GIVE DIRECTIONAL  
ACCELERATION TO PARTICLES.

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**FIG. 11**

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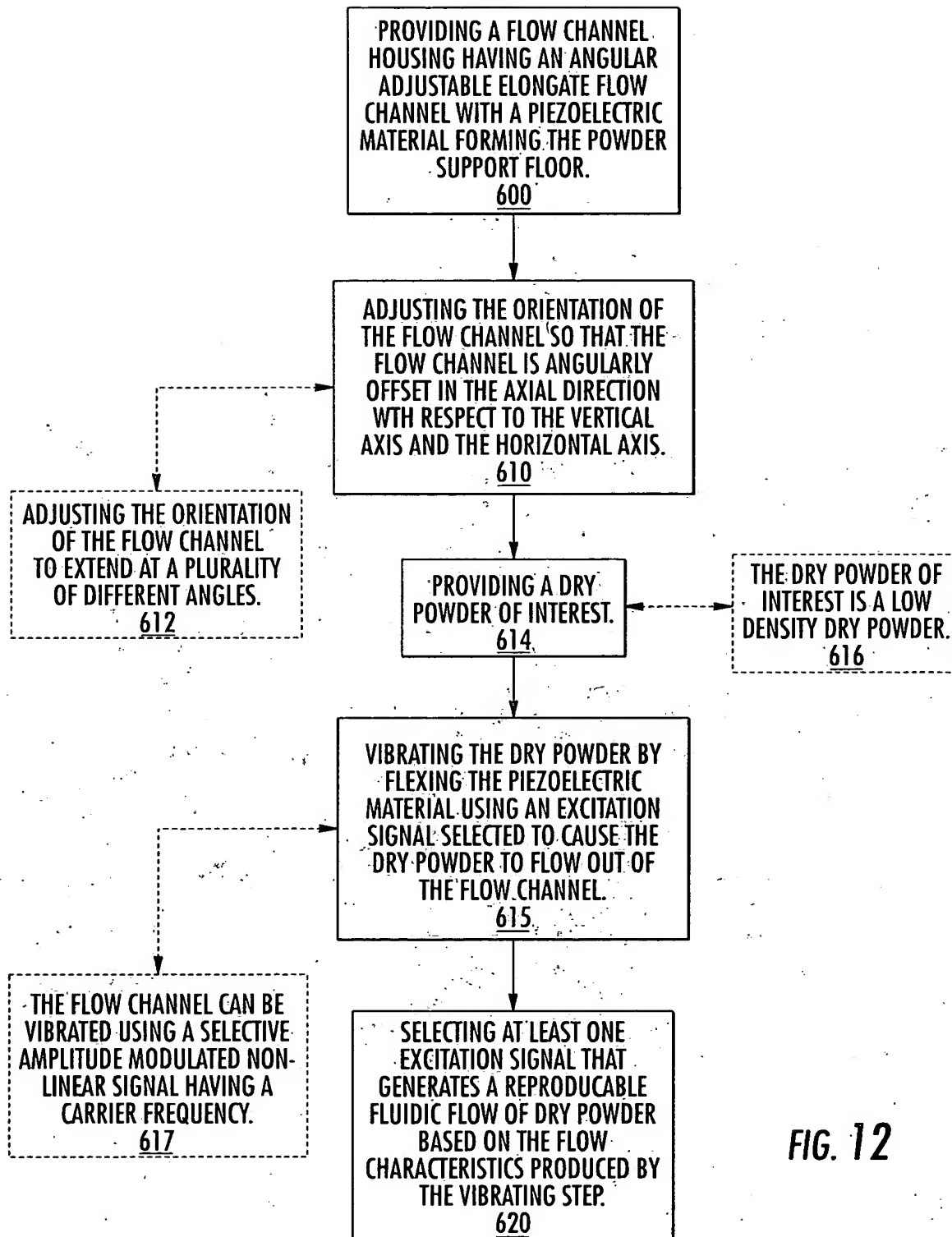
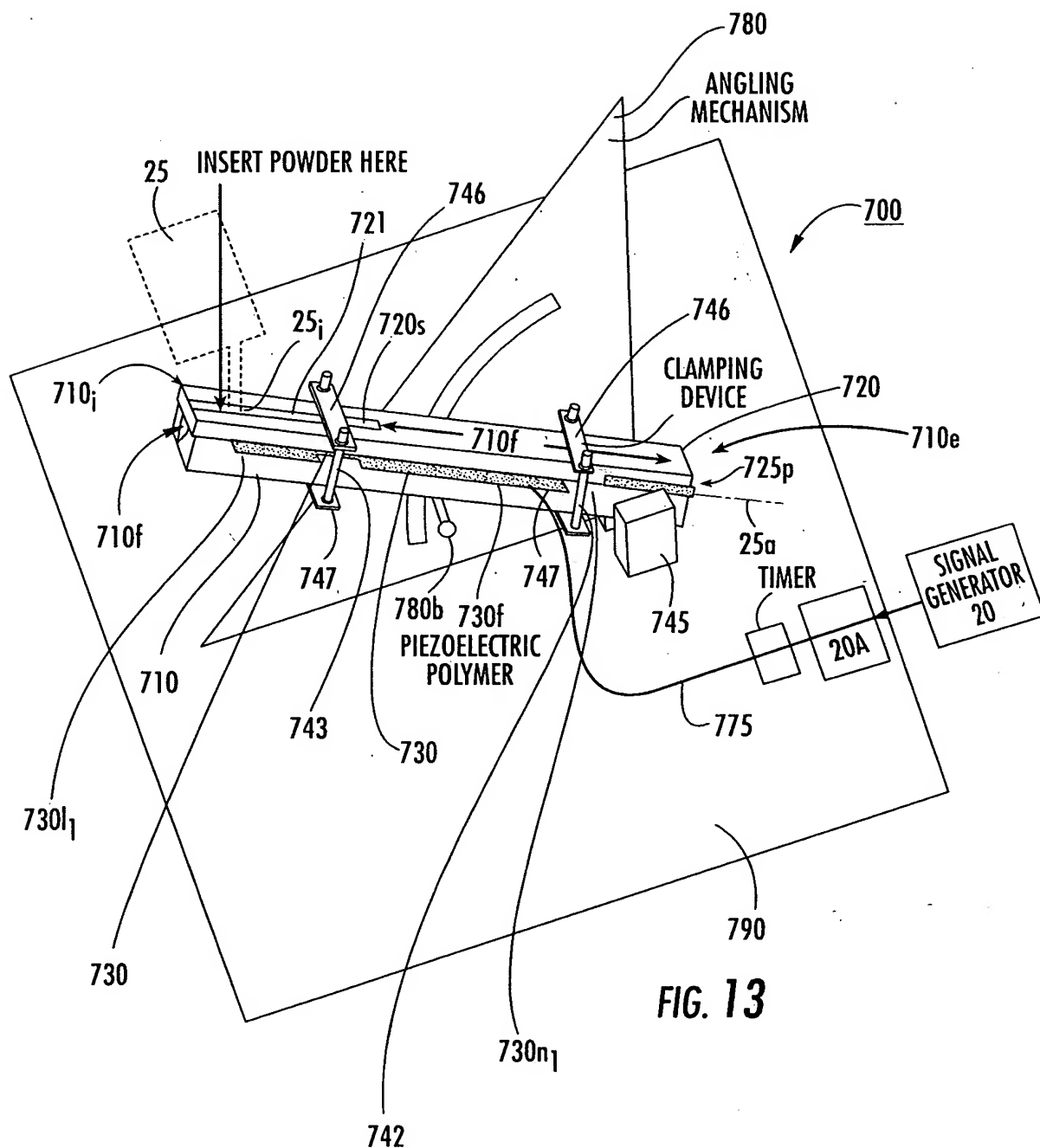
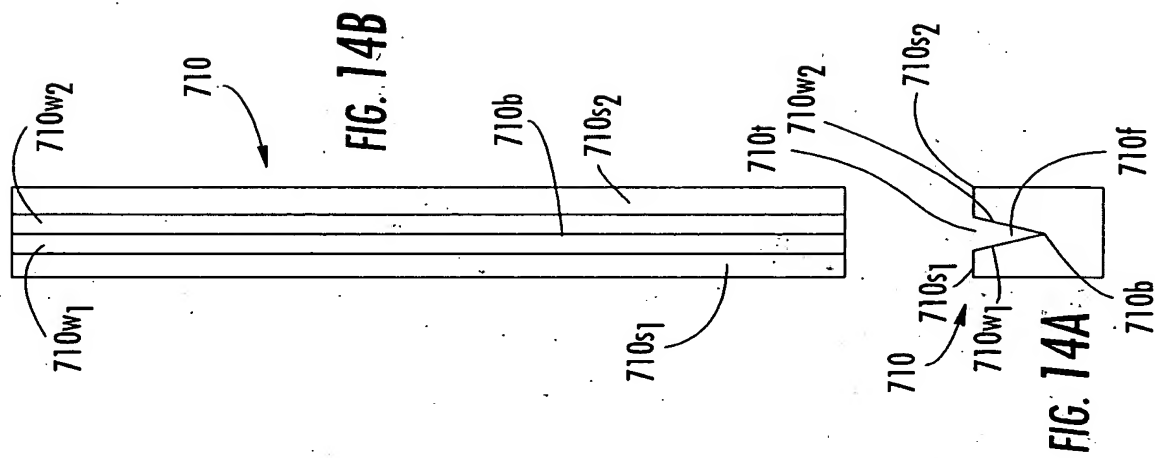


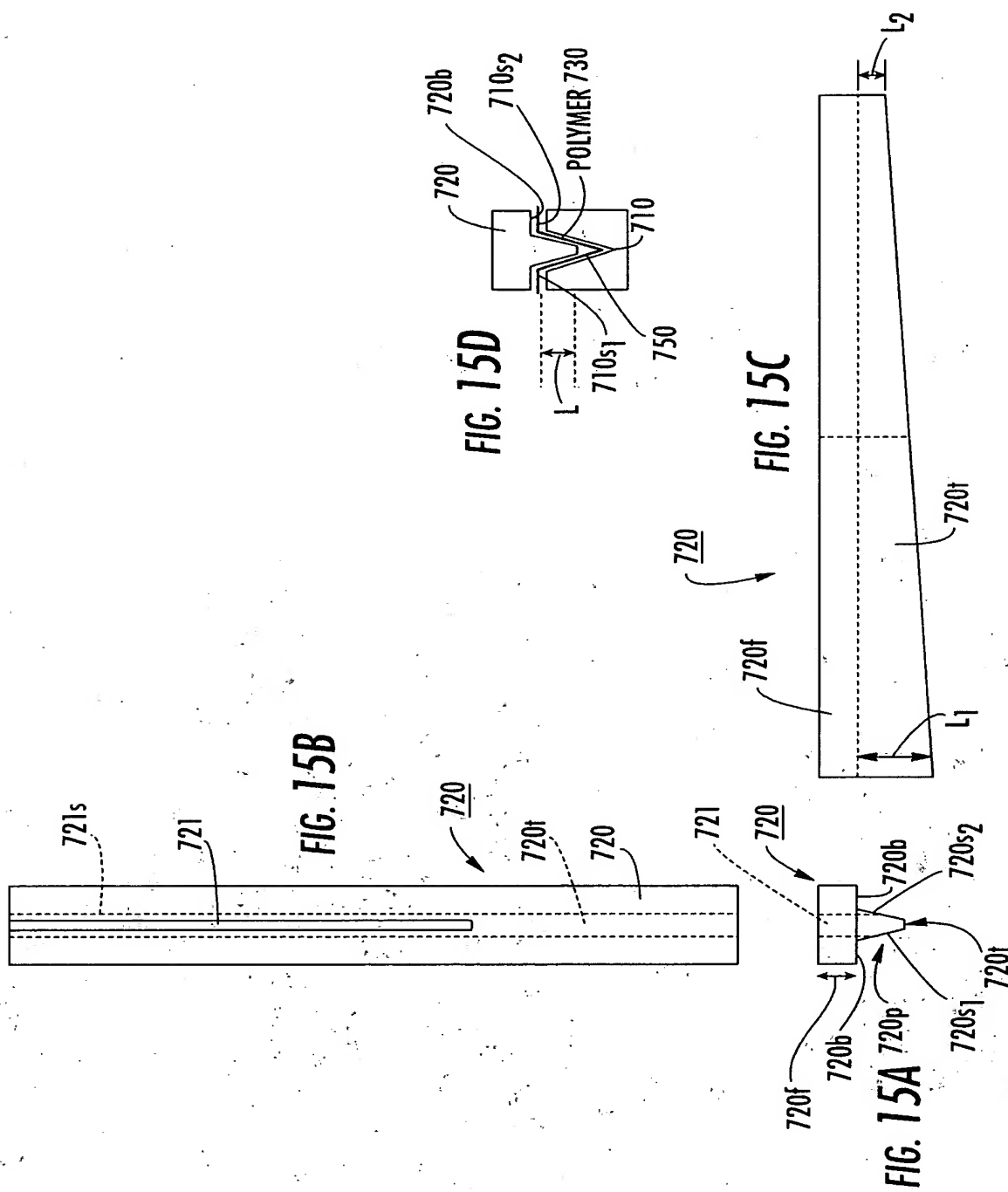
FIG. 12

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CHANNEL



PART 3: PIEZOELECTRIC POLYMER

